Course Title	**Sedimentary Geology**		
Course Code	**ES2004**		
Offered	Study Year 2, Semester 2		
Course Coordinator	Sylvain Rigaud (Dr)	srigaud@ntu.edu.sg	6513 8228
Pre-requisites	ES1003		
AU	3		
Contact hours	Field Trip: 35, Laboratories: 30, Lectures: 18		
Approved for delivery from			
Last revised	24 Apr 2020, 11:26		

Course Aims

This course introduces the main concepts of sedimentary geology. By bridging the tools of sedimentology, palaeontology, stratigraphy, and basin analysis, you will learn how to identify, describe, reconstruct and interpret major depositional environments. From the study of individual grains to the study of sedimentary basins, you will discover what controls the formation of sedimentary rocks and basins, and their evolution through time. This course includes a field component to provide opportunities to apply class principles and theories, and compare modern and past depositional settings. The skills that you will develop during this course are fundamental to any geoscientist.

Intended Learning Outcomes

Upon successfully completing this course, you should be able to:

1. Describe and analyse sediments, sedimentary rocks, and sedimentary basins.
2. Use grain and/or sediment characteristics to identify and/or contrast depositional environments.
3. Identify, discriminate and conceptualise the influences of tectonics and or sea-level changes on sedimentation.

Course Content

The basics principles of sedimentology, palaeontology, stratigraphy and basin analysis.

The chemical and physical processes that affect sediments and sedimentary rocks at the earth's surface and at burial depths of up to 10-15 kilometres.

The main scientific methods and tools sedimentary geoscientists use in the office, lab, and field to describe and analyse sediments and sedimentary rocks.

Assessment

Component	Course ILOs tested	ASE Graduate Attributes tested	Weighting	Team / Individual	Assessment Rubrics
Continuous Assessment					
Field Trip					
Field exercises and tables	1, 2, 3	**1 - 10**	30	both	See Appendix for rubric
Laboratories					
Lab exercises and quizzes	1, 2, 3	**1 - 10**	40	both	See Appendix for rubric
Lectures					
Quizzes	1, 2, 3	**1 – 6, 8**	30	individual	See Appendix for rubric
Total			**100%**		

These are the relevant ASE Graduate Attributes.

1. Apply environmental knowledge, concepts and skills to make sound decisions

Interpret evidence to give sound environmental advice to stakeholders

2. Demonstrate intellectual flexibility and critical thinking

Demonstrate intellectual flexibility to view environmental issues from multiple perspectives

Question assumptions behind current ways of solving environmental problems

3. Demonstrate passion and use advanced communication skills to share that passion

Effectively communicate environmental concepts in writing

Effectively communicate environmental concepts in various forms of media such as data visualisation, diagrams, animation, video, or podcasts

4. Formulate key scientific questions and develop hypotheses

Research and formulate questions involving environmental issues

Create and evaluate hypotheses to research such questions

5. Conduct research

Make first-hand observations in order to draw conclusions

6. Solve environmental problems

Demonstrate creative approaches to solving environmental problems

Express and explain why the problems are important

7. Synthesize interdisciplinary approaches to solving problems

Apply techniques from diverse disciplines to solve environmental problems

8. Demonstrate the willingness and skills for lifelong learning

Demonstrate aptitude and enthusiasm to learn independently

Demonstrate good observation skills and a curiosity about the world

9. Demonstrate ethical values

Respect regulations involving plagiarism and copyright

10. Demonstrate collaboration and leadership skills

Learn collaboratively and be willing to share expertise with peers

Demonstrate leadership of small teams

Formative Feedback

Following lab sessions and field work, you will receive direct written feedback up to two weeks after you present your assignments and reports. In this way the lecturer and you can monitor progress. You will also be given oral feedback on your final quizzes.

Learning and Teaching Approach

Field Trip (35 hours)	The field trips will i) Allow you to observe and compare various sediments, sedimentary structures, sedimentary rocks and depositional environments. ii) Allow you to apply field techniques and methods. iii) Enable you to understand the importance of field work in solving geoscience-related issues.
Laboratories (30 hours)	Lab sessions will i) consolidate your sedimentary grain and rock description skills. ii) develop your petrographic skills. iii) introduce you to core logging and diagenesis.
Lectures (18 hours)	Lectures will pass on the theoretical knowledge required to reconstruct past depositional environments, pinpoint controls on environmental changes, and understand the importance of sedimentary rocks in the rock cycle.

Tutorials (12 hours)	NA

Reading and References

Tucker, M.E., 2003. Sedimentary Rocks in the Field: A Practical Guide, 4th Edition. John Wiley & Sons. 288pp. ISBN: 978-0-470-68916-5

Nichols, G., 2012. Sedimentology and Stratigraphy, 2nd Edition. Wiley-Blackwell. 456pp. ISBN: 978-1-444-39712-3

Course Policies and Student Responsibilities

(1) General
You are expected to complete all assigned readings and activities, attend all classes punctually and take all scheduled assignments, reports and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements. You are expected to participate in all seminar discussions and activities.

(2) Absenteeism
In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the Academic Integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	**Office Location**	**Phone**	**Email**
Sylvain Rigaud (Dr)	N2-01b-30	6513 8228	srigaud@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course ILO	Readings/ Activities
1	Introduction - course presentation / Continental terrestrial depositional environments / clastic sediments	1, 2	Books 1 & 2
2	Continental aquatic depositional environments / Bioclasts & Fossils	1, 2	Books 1, 2
3	Coastal depositional environments / Rock types	1, 2	Books 1, 2
4	Volcanic depositional environments / Core description-logging	1, 2	Books 1, 2
5	Marine depositional environments / Microfacies	1, 2, 3	Books 1, 2
6	Stratigraphy	1, 2, 3	Books 1 & 2
7	Pedogenetic structures	1, 2, 3	Books 1 & 2
8	Burial & Diagenesis	1	Books 1 & 2
9	Field trip: Singapore	1, 2	Books 1 & 2
10	Basin analysis	1, 3	Books 1 & 2
11	Sequence stratigraphy	3	Book 2
12	Seismic interpretation & Wheeler Diagram	1, 3	Book 2
13	Final quizzes	1, 2, 3	

Appendix 1: Assessment Rubrics

Rubric for Field Trip: Field exercises and tables (30%)

You will be assessed individually for most field exercises. The assessments that are team-based (such as sedimentary logging) will constitute a maximum of 10% of your final grade.

SECTION	UNSATISFACTORY (fail mark)	MARGINAL (fail mark)	SATISFACTORY (pass mark)	VERY GOOD (A-/A)	EXCELLENT (A+)	POINTS
Format	· Not adapted	· Poorly adapted	· Adapted	· Handy, field-adapted	· Reference field work	5
	· No organization	· Poorly organized	· Organized	· Well-organized, consistent	· Perfectly organized, excellent work	

Illustrations	· No or fictive drawings/pictures	· Incomplete, non-representative or disproportionate drawings/pictures	· Representative drawings/pictures	· Clear, representative drawings/pictures	· Neat and meaningful scientific drawings/pictures	10
	· No legend, label, scale, orientation, title	· Minimalistic legend and labels, inaccurate scale bars	· Important features labelled, properly scaled	· Most features labelled, properly scaled	· All features labelled, homogeneously scaled	
Description / Context	· No description, no context	· Incomplete descriptions, no context	· Description and context provided	· Clear descriptions and context	· Thoughtful, clear and complete information	10
Scientific Implications	· Missing or showing a lack of understanding	· Showing a poor understanding	· Important implications provided	· Most scientific implications provided	· Advanced state of scientific knowledge	10
	· No research, no sources	· Limited research, cited sources not relevant	· Sources cited appropriately	· Relevant and well-cited sources	· Diverse, relevant and thoroughly cited sources	
Mechanics	· Illegible	· Messy, rushed job	· A few typos, grammar mistakes	· Well-written	· Well-written, no typos or mistakes	5
	· Not refined, copy-pasted text (plagiarism)	· Poorly refined text	· Mostly refined, clean-up text	· Comprehensive yet succinct	· Brilliant summary	

Rubric for Laboratories: Lab exercises and quizzes (40%)

You will be assessed individually for most lab exercises. The assessments that are team-based (such as the core description assessment) will constitute a maximum of 5% of your final grade.

SECTION	UNSATISFACTORY (fail mark)	MARGINAL (fail mark)	SATISFACTORY (pass mark)	VERY GOOD (A-/A)	EXCELLENT (A+)	POINTS
Format	· Not adapted, not organized	· Poorly adapted & organized	· Adapted & organized	· Well-adapted, organized and consistent	· Reference work	2.5

Drawings / Pictures / Charts	· No or fictive drawings/pictures/charts	· Incomplete, non-representative or disproportionate drawings/pictures/charts	· Representative drawings/pictures/charts	· Clear, representative drawings/pictures/charts	· Neat and meaningful scientific drawings/pictures/charts	5
	· No legend, label, scale, orientation, title	· Minimalist legend and labels, inaccurate scale bars	· Important features labelled, properly scaled	· Most features labelled, properly scaled	· All features labelled, homogeneously scaled	
Description / Context	· No description, no context	· Incomplete descriptions, no context	· Description and context provided	· Clear descriptions and context	· Thoughtful, clear and complete information	5
Scientific Implications	· Missing or showing a lack of understanding	· Showing a poor understanding	· Important implications provided	· Most scientific implications provided	· Advanced state of scientific knowledge	5
Mechanics	· Illegible	· Messy, rushed job	· A few typos, grammar mistakes	· Well-written and comprehensive	· Well-written, comprehensive and refined	2.5

Rubric for Lectures: Quizzes (30%)

SECTION	UNSATISFACTORY (fail mark)	MARGINAL (fail mark)	SATISFACTORY (pass mark)	VERY GOOD (A-/A)	EXCELLENT (A+)	POINTS
Format	· Not adapted, not organized	· Poorly adapted & organized	· Adapted & organized	· Well-adapted, organized and consistent	· Reference work	2.5
Diagrams	· No or fictive diagrams	· Incomplete, non-representative or disproportionate diagrams	· Representative diagrams	· Clear, representative diagrams	· Neat and meaningful scientific diagrams	5
	· No legend, label, scale, title	· Minimalistic legend and labels, inaccurate scale bars, poor title	· Important features labelled, properly scaled	· Most features labelled, representative legend	· All features labelled, professional legend	

Description / Context	· No description, no context	· Incomplete descriptions, no context	· Description and context provided	· Clear descriptions and context	· Thoughtful, clear and complete information	5
Scientific Implications	· Missing or showing a lack of understanding	· Showing a poor understanding	· Important implications provided	· Most scientific implications provided	· Advanced state of scientific knowledge	5
Mechanics	· Illegible	· Messy, rushed job	· A few typos, grammar mistakes	· Well-written and comprehensive	· Well-written, comprehensive and refined	2.5

Appendix 2: Intended Affective Outcomes

As a result of this course, it is expected you will develop the following "big picture" attributes:

An ability to look at natural environments in a new light.

A perseverance capacity to solve challenging tasks.

A geological notion of space and time.